Small Business Opportunities with the Army

Science, Technology and Requirements Forum

Maneuver Support Center of Excellence (MSCoE)
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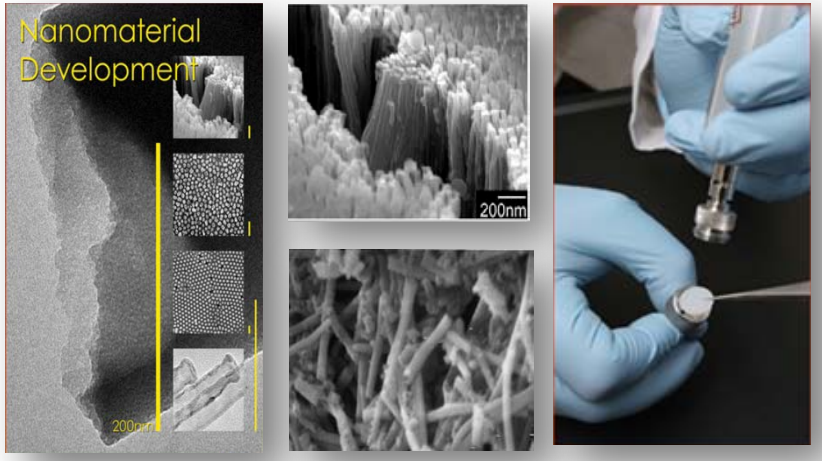
What We Do

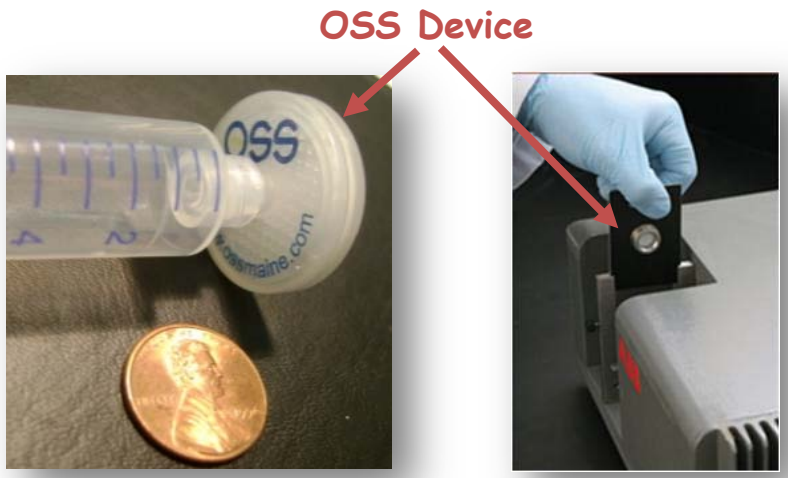
RESEARCH

Innovate nanomaterials and sampling methods for reagentless trace detection of chem/bio agents



DEVELOPMENT

Integration of OSS tech with optical based detection systems (IR/Raman)



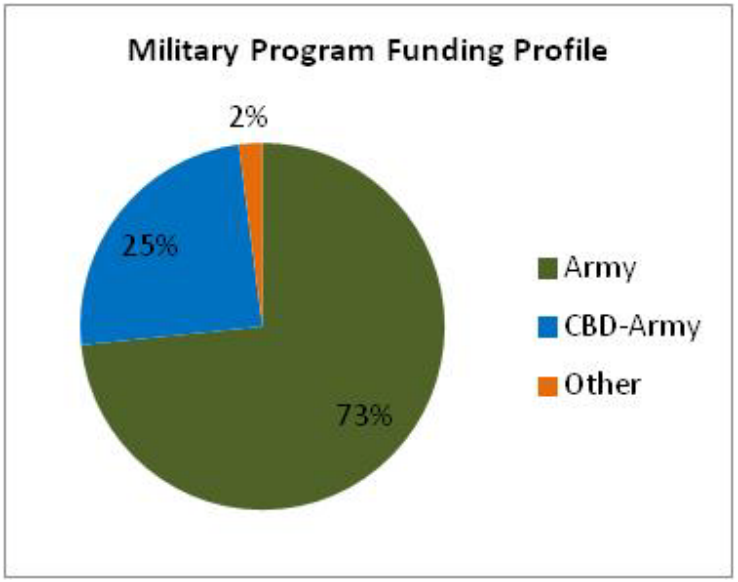
COMMERCIALIZATION

IP portfolio development leading to licensing and sales opportunities

Doing Business with the Army

Historically

- BAAs
- SBIRs/STTRs
- Primary Customer: S&T Army/CBD-Army



Challenge: Commercializing S&T Funded Tech

- great ideas leading to functional prototype deliverable, but limited / no pull at end of contract
- ***Increased alignment between S&T and JPM / JRO = Commercialization Success***

Current Strategy

- Identify and work with larger strategic industry partners
- License IP / Distribution Agreements
- Proving tech through Live Agent Testing ***GREATLY*** advances our business

Live Agent Testing - ECBC

ECBC Live Agent Testing
Summer/Fall 2010

Water Sampling Kit Mockup

Agents in Water Successfully Tested

- Cyanide (200 ppb)
- Anthrax (10^4 CFU)
- VX (50 ppm)

Commercial Spinoff Products (2013)

- Oil/Grease in water analysis (ASTM D7575)
- Surface Sampler (sold with HazMatID™ Elite)

Commercially Available (2013)
For ASTM D7575 Testing

Business Opportunity 1:

OSS M8 Detection Paper

SBIR Phase I/II: US Army RDECOM – W911SR-12-C-0052

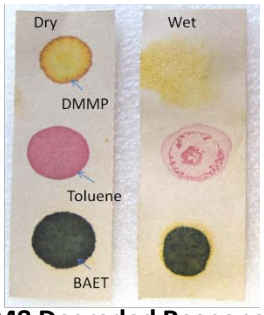
Improved M8 Chemical Agent Detector Paper for Facilities Monitoring

Orono Spectral Solutions Inc, Bangor, ME (www.ossmaine.com)

Project Mission

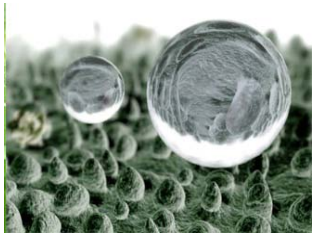
To develop coatings for M8 paper that improve its robustness and rate of detection for chemical warfare agent (CWA) attacks.

M8 Paper in the field



M8 Degraded Response

Lotus Leaf



Superhydrophobic + oleophilic material

Innovations and Significance

• Modify COTS M8 paper with ultrathin superhydrophobic and oleophilic material coatings that provide self-cleaning and waterproofing while retaining its detection capabilities for CWA

• Mimic naturals surfaces (lotus leaf) by fabricating low surface energy materials in combination with appropriate surface morphologies that increases micro/nanoscale roughness.

• Develop transduction mechanisms that integrate improved M8 paper with a self-reporting system (wireless sensor network arrays).

Dual Use Applications

• Homeland Security

• First Responders

PI Contact

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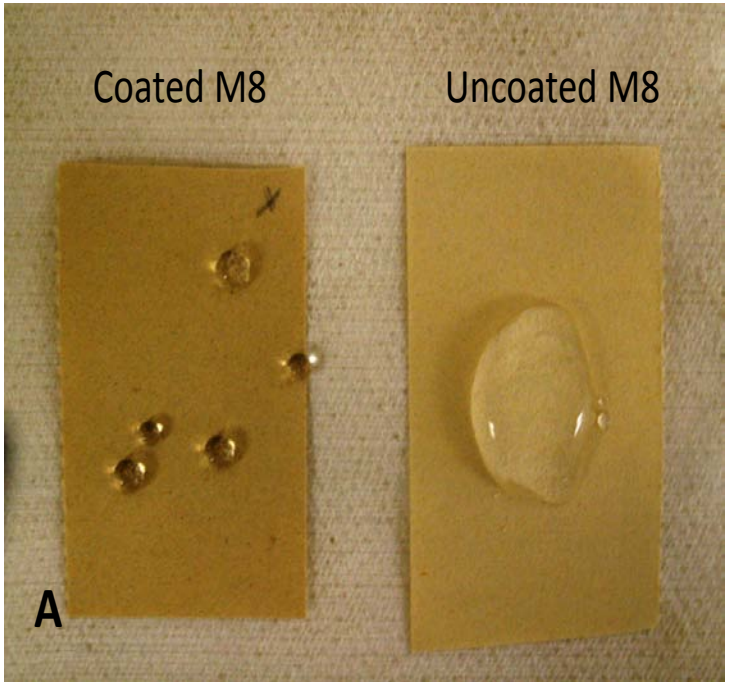
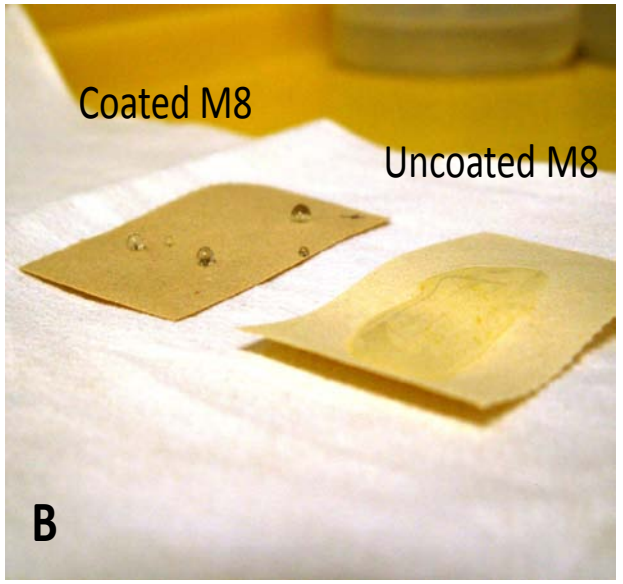
Phase I Summary: OSS M8 Paper

Waterproof Properties of OSS M8 Paper



Time = 0 Minutes



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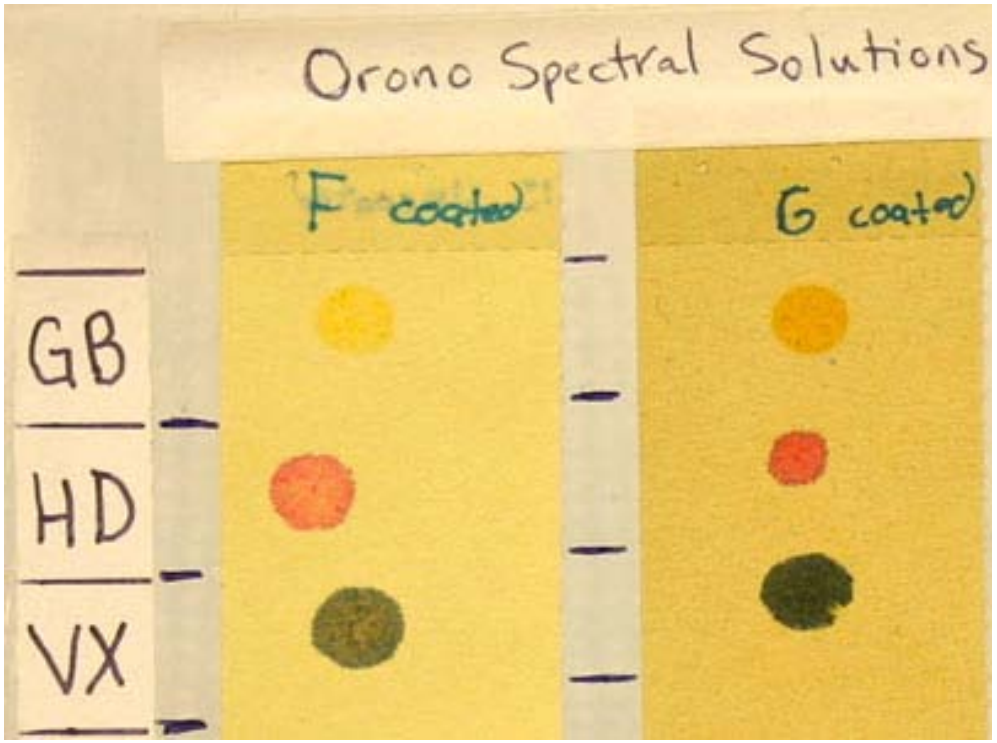
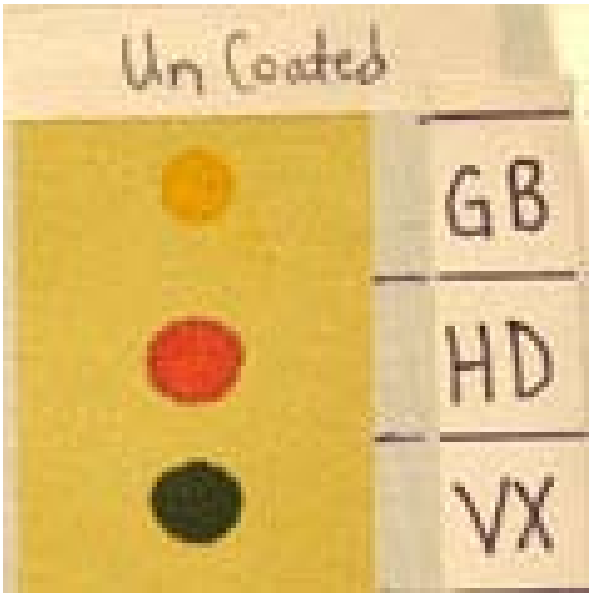
Phase I Summary: ECBC Live Agent Testing

Performance of OSS Coated M8 Paper





Bottom Line: OSS M8 Successfully Detected CWAs

<u>End Users Want this Now!</u>

Business Opportunity 2:

OSS Surface Sampler

Multi-Agent Surface Sampler Integrated with Smiths Detection's HazMatID™ Elite Handheld Chemical Identifier

Orono Spectral Solutions Inc, Bangor, ME (www.ossmaine.com)

Army Contract # W911SR10C0064

Project Goal/Product Description

To develop a simple to use multi-agent surface sampling device that is fully integrated with Smiths Detection's HazMatID Elite chemical identifier.

Technical Innovations

• One device that is capable of collecting any chem, bio, TIC, TIM, explosive, and narcotic agent

• Successfully collects agents from any surface (plastic, metal, painted metal, roughened asphalt, concrete, ceramics, wood, vegetation, clothing, and much more)

• Collector material produces no interfering IR signature when used with ATR-IR based detectors (no changes to onboard ID algorithms)

• Collector material also being tested with Raman and IMS hardware

• Made of ruggedized material capable of withstanding harsh sampling and environmental conditions (high resistance to corrosion, temperature, shock)

Benefits to Warfighter/End User

• Proven technology that has been successfully tested at ECBC against live agents and NTAs on a variety of different surfaces

• Completely streamlined collection-to-identification process

• Fully integrated with known and trusted detection system hardware

•Works with any powder, liquid or chemical residue on any surface

POC

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Explosives on Fabric Detection

Fabric Sampled Using OSS Surface Sampler

PETN Positive ID with OSS Sampler

Fabric Analyzed Directly

PETN Non-Detect

**Not common scale

.03
.02
.01
0
-.01

3500 3000 2500 2000 1500 1000 500

- Direct analysis of explosives on the fabric is not possible due to interferences from the fabric
- OSS Surface Sampler is capable of extracting the explosive off of the fabric and allowing for positive ID of the agent

Live Agent Testing – ECBC

- 8 different agents ***positively identified*** (G, H, V, NTAs)
- 7 different surfaces (stainless steel, linoleum, drywall, Formica, asphalt, concrete)
- Current Status: Finalizing production; sale by early 2013
- Funding opportunities being sought for next-gen developments:
  - RFID tagging
  - Increased sensitivity for sub μg detection with HazmatID Elite
  - Single collection device for multi-instrument use (ex: Raman, IMS/JCAD, M8, pH)

Summary

- ***OSS continues to be responsive to S&T needs for new tech***
- ***Alignment with S&T and JPM/JRO***  ***Small Business Success Stories***

WHY IS THIS IMPORTANT TO THE ARMY/DOD?

- ***Respond more quickly to emerging needs/threats***
  - ***ex: OSS M8 developed in 6 months on a Phase I Budget!***
- ***Drivers of Innovation***
  - ***ex: we have filed 10 patent apps. in last 5 years (6 US, 4 International)***
- ***High Return on Investment (ROI)***
  - ***ex: basic R&D to Product … by an 8 person company!***

Questions?

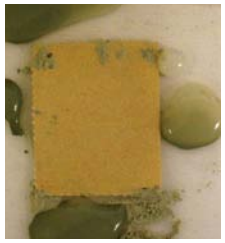
Back Up Slides

Phase I Summary: Durability Testing

Self Cleaning Properties of OSS Coated M8

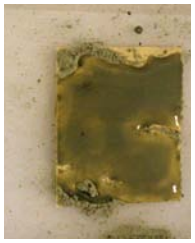
Before Adding Simulants

A



Coated M8

B



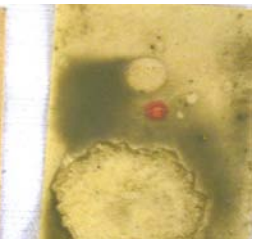
Uncoated M8

After Adding Simulants

C

Coated M8

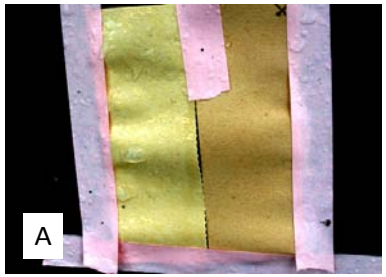
D



Uncoated M8

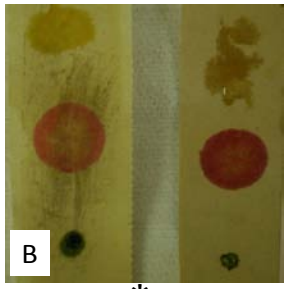
7 Days of Being Stuck to side of OSS facility in winter (snow melt)

Condition During Snow Melt



Uncoated M8 **Coated M8**

Response to CWA Simulants



Uncoated M8* **Coated M8**

* Had to replace uncoated M8 after snow melt (paper fell apart)

Other Tests

1) **UV Testing: Simulated 240 hours of intense sunlight → No Change in Performance**
2) **Shelf Life: Retested First films from 13 months ago → No Change in Performance**

Phase II Planned Activities

Work Plan:

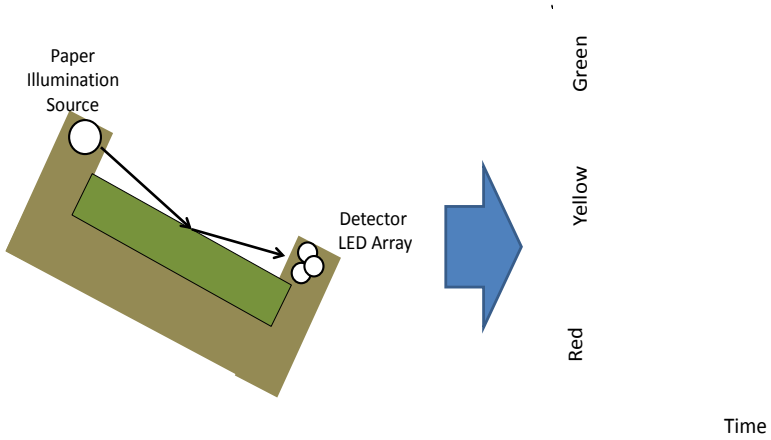
- Develop transduction system for automated reading (optical, electrical)
- Design and build automated reader for OSS M8 (single node)
- Develop wireless sensor network for self reporting (multi-node system)
- Live Agent Testing

Deliverables/Products:

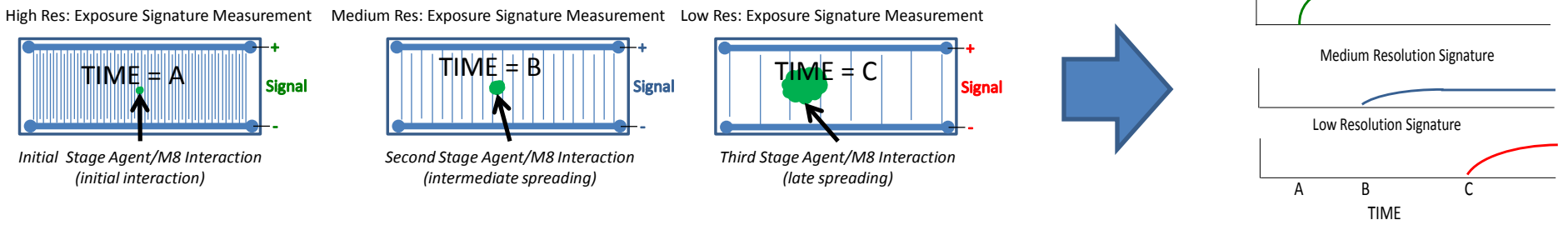
- OSS M8
- Autonomous Self Reporting CWA Detection System (Advance Force Protection)

Phase II - Planned Activities

Year 1: Develop Transduction Systems for Automated Reading



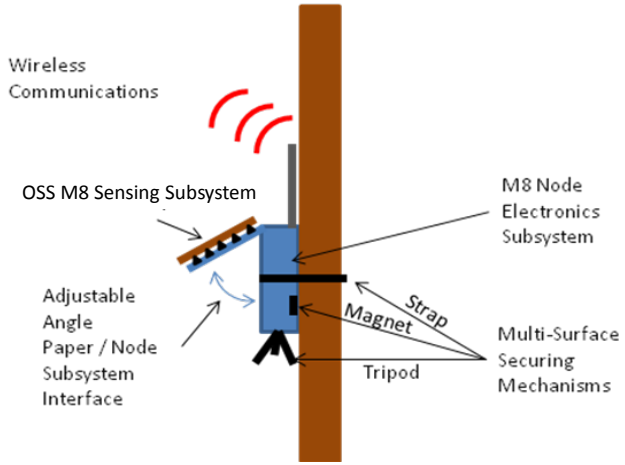
Optical Transduction



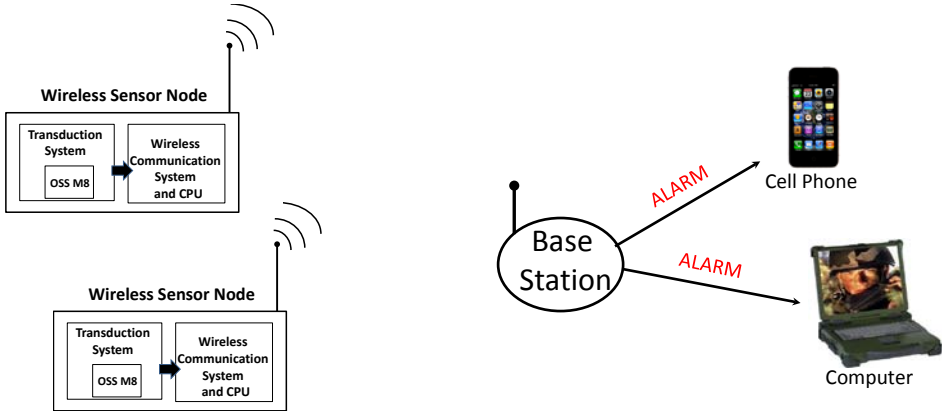
Electronic Transduction

Phase II - Planned Activities

Year 2: Develop Wireless Sensor Network for Self Reporting



Wireless Node Construction



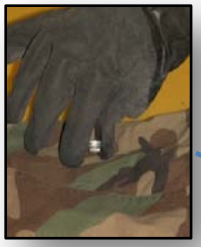
Autonomous Network Development

OSS Multi-Agent Surface Sampler

OSS Surface Sampler

> 30 surfaces successfully tested

Successfully identify all agent classes



Asphalt

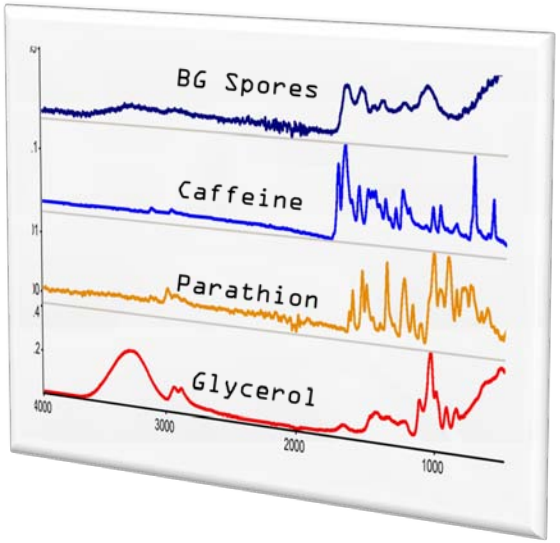
Fatigues

Painted Metal

Vegetation

Plastic Case

HazMatID Elite
Handheld Chemical Identifier



Positive ID for Chem, Bio, Narcotics, Explosives, TICs/TIMs, NTAs

Surfaces Successfully Tested

Surface Sampler Prototype

Polymers
- Polyethylene
- Polypropylene
- Acrylic
- Polycarbonate
- Vinyl
- Polyester (Military Textile)
- Aluminized Mylar

Metals
- Painted steel
- Rusted Steel
- Corrugated Steel
- Bare Steel
- Galvanized Steel
- Stainless Steel
- Powder Coated Steel
- Polished Aluminum
- Brushed Aluminum
- Bare Copper

Natural Products
- Bare Wood
- Painted Wood
- Stained Wood
- Pressure Treated Wood
- Corrugated Cardboard
- Paperboard
- Cotton (Military Textile)

Other (porous)
- Fiberglass
- Terra Cotta
- Concrete
- Asphalt
- Ceramic

Other (nonporous)
- Glass
- Porcelain

Agents/Simulants Successfully Tested on Surfaces

Surface Sampler Prototype

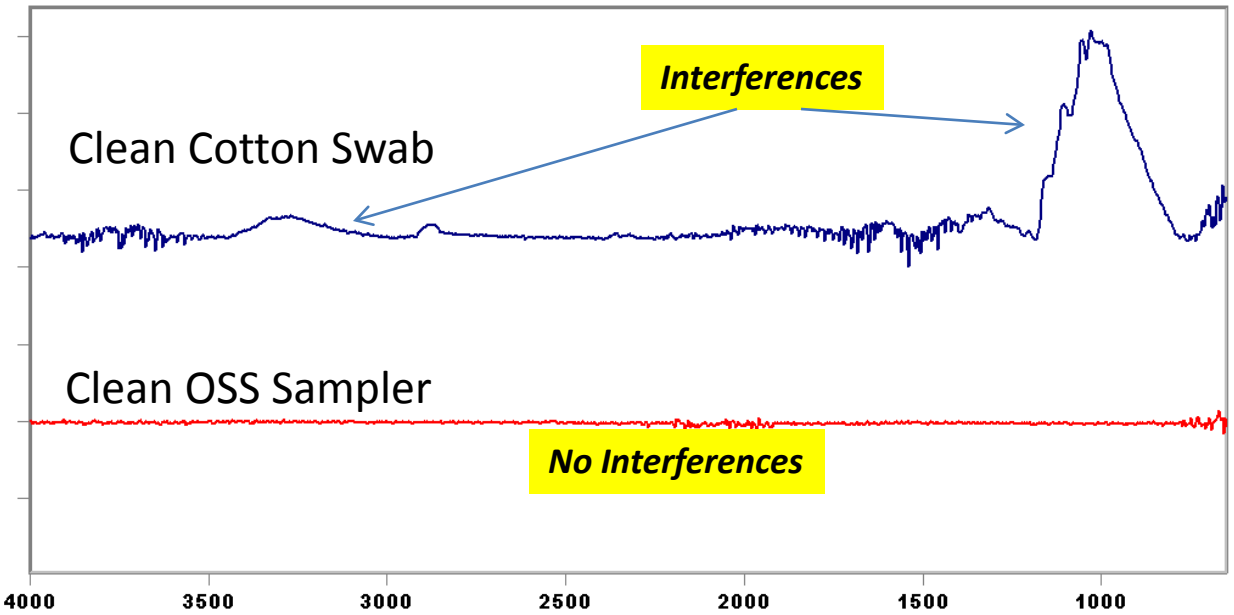
"White Powders"

- Baking Soda
- Baking Powder
- Baby Powder
- Caffeine
- Corn Starch
- Sugar
- Bacterial Spores

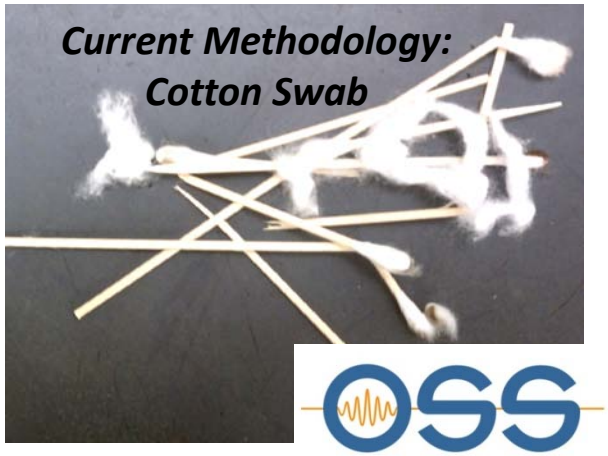
Liquids

- Parathion (pesticide)
- Malathion (pesticide)
- Glycerol
- PETN (high explosive)
- RDX (high explosive)
- Dimethyl Phosphate
- Silicone Oil
- Vegetable Oil

Surface Sampling Comparison



Surface Sampler Prototype



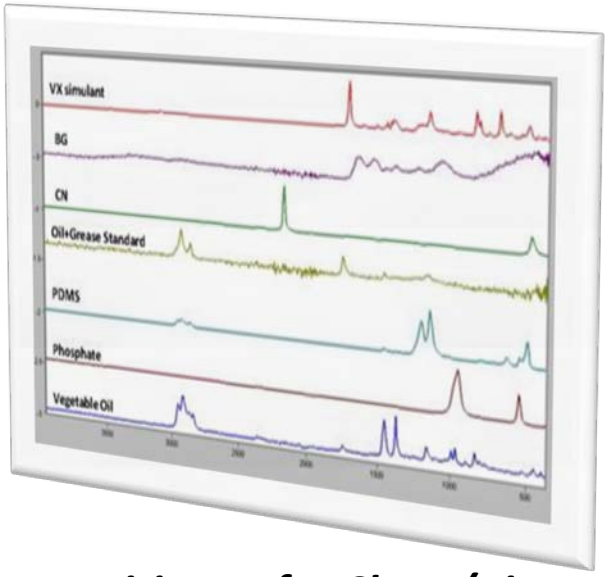
OSS CBD Water Extractor

Validated through ECBC Live Agent Testing

Commercially Available
For ASTM D7575 Testing

Mock Up of OSS
Chem/Bio Sampling Kit

FTIR ATR Analysis



Positive ID for Chem/Bio
Agents in Water

Agents/Simulants Successfully Tested in Water

ECBC Live Agent Testing
Summer/Fall 2010

Commercially Available
For ASTM D7575 Testing

- Hydrocarbons (ASTM D7575)
- Cyanide (ECBC Validated)
- Anthrax (ECBC Validated)
- VX (ECBC Validated)
- Phosphate
- Silicate
- Silicone Oil
- DEAET (CWA Simulant)